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## Georgia Performance Standards Framework for Science – Grade 4

### **Unit One Organizer: Water Cycle & Weather** **(Approximate Time – Seven Weeks)**

**OVERVIEW:** This unit teaches the stages of the water cycle and how each stage is formed by relating it to the states of water (solid, liquid, and gas) and the temperatures that water changes state. This unit will allow students to investigate how clouds are formed. The collecting and analyzing of weather data are used to predict weather. Weather instruments, weather maps, and weather symbols are used during this unit to collect and communicate the weather data needed.

#### **STANDARDS ADDRESSED IN THIS UNIT**

##### **Focus Standards:**

##### **S4E3. Students will differentiate between the states of water and how they relate to the water cycle and weather.**

- a. Demonstrate how water changes states from solid (ice) to liquid (water) to gas (water vapor/steam) and changes from gas to liquid to solid.
- b. Identify the temperatures at which water becomes a solid and at which water becomes a gas.
- c. Investigate how clouds are formed.
- d. Explain the water cycle (evaporation, condensation, and precipitation).
- e. Investigate different forms of precipitation and sky conditions. (rain, snow, sleet, hail, clouds, and fog).

##### **S4E4. Students will analyze weather charts/maps and collect weather data to predict weather events and infer patterns and seasonal changes.**

- a. Identify weather instruments and explain how each is used in gathering weather data and making forecasts (thermometer, rain gauge, barometer, wind vane, anemometer).
- b. Using a weather map identify the fronts, temperature, and precipitation and use the information to interpret the weather conditions.
- c. Use observations and records of weather conditions to predict weather patterns throughout the year.
- d. Differentiate between weather and climate.

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**STANDARDS ADDRESSED IN THIS UNIT**

**Supporting Standards:**

**S4CS2. Students will have the computation and estimation skills necessary for analyzing data and following scientific explanations.**

- a. Add, subtract, multiply, and divide whole numbers mentally, on paper, and with a calculator.

**S4CS3. Students will use tools and instruments for observing, measuring, and manipulating objects in scientific activities utilizing safe laboratory procedures.**

- c. Use computers, cameras, and recording devices for capturing information.

**S4CS4. Students will use ideas of system, model, change, and scale in exploring scientific and technological matters.**

- d. Use geometric figures, number sequences, graphs, diagrams, sketches, number lines, maps, and stories to represent corresponding features of objects, events, and processes in the real world. Identify ways in which the representations do not match their original counterparts.
- c. Identify patterns of change in things- such as steady, repetitive, or irregular change—using records, tables, or graphs of measurements where appropriate.

**S4CS5. Students will communicate scientific ideas and activities clearly.**

- d. Locate scientific information in reference books, back issues of newspapers and magazines, CDROMs, and computer databases.

**ENDURING UNDERSTANDINGS**

- Some events in nature have a repeating pattern. The weather changes some from day to day, but things such as temperature and rain (or snow) tend to be high, low, or medium in the same months every year.
- Water can be a liquid or a solid and can go back and forth from one form to the other. If water is turned into ice and then the ice is allowed to melt, the amount of water is the same as it was before freezing.
- Water left in an open container disappears, but water in a closed container does not disappear.
- Weather is a daily occurrence, climate occurs over an extended period of time.
- Different temperatures affect water, by changing the states.
- Identify weather instruments, thermometer, rain gauge, barometer, wind vane, and anemometer.

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<b>ESSENTIAL QUESTIONS</b>	
<ul style="list-style-type: none"> <li>• Do we drink the same water that was on earth a million years ago?</li> <li>• What form does water take on our earth?</li> <li>• What happens daily to the water on earth?</li> <li>• How does water change from a solid to a liquid to a gas?</li> <li>• How does water change from a gas to a liquid to a solid?</li> <li>• How are clouds formed?</li> <li>• What is the water cycle?</li> <li>• What are forms of precipitation?</li> <li>• Why do we use the following weather instruments: rain gauge, thermometer, anemometer, barometer, and wind vane?</li> <li>• How do we distinguish between weather and climate?</li> <li>• Why do we use symbols on a weather map and what do they mean?</li> <li>• How do we know a weather forecast is accurate?</li> <li>• Where does water go in a drought?</li> </ul>	
<b>MISCONCEPTIONS</b>	<b>PROPER CONCEPTIONS</b>
The water cycle involves freezing and melting of water.	The water cycle involves liquid water being evaporated, water vapor condensing to form rain or snow in the clouds which falls to the earth.
Water only gets evaporated from the ocean or lakes.	Water can evaporate from plants, animals, puddles and the ground in addition to bodies of water.
When water boils and bubbles come up the bubbles are air.	Bubbles that form and rise when water is boiling consist of steam (or water vapor).
The white substance coming from boiling water is smoke.	The gas escaping from boiling water is water vapor. When this vapor condenses in the air it is visible as tiny water droplets.
Water in an open container is absorbed by the container.	Water left in an open container evaporates, changing from liquid to gas.

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<p>Condensation on the outside of a container is water that seeped through the container itself (or sweated through the walls of the container)</p> <p>Raindrops look like tear drops.</p> <p>Rain falls out of the sky when the clouds evaporate.              Rain comes from holes in clouds.              Rain comes from clouds sweating.              Rain comes from clouds melting.              Rain falls from funnels in the clouds.</p> <p>Clouds move when we move. We walk and the clouds move with us.</p> <p>Thunder occurs when two clouds collide.</p>	<p>Condensation is water vapor in the air, which cools sufficiently to become a liquid. This usually happens when the water vapor comes in contact with a (cool) surface.</p> <p>Raindrops’ shape is based on their size. Small raindrops are spherical, medium sized raindrops are a bit flattened but still basically spherical, and larger raindrops get distorted until they break into smaller drops.</p> <p>The shape is dependent upon the surface tension of water and the air pressure pushing up on the drop as it falls.</p> <p>Rain begins to fall when water drops in the cloud are too heavy to remain airborne.</p> <p>Clouds move when wind blows them.</p> <p>Thunder and lightning are the visible and auditory effects of a massive charge transfer between clouds.</p>
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**LANGUAGE**

**water cycle, solid, liquid, gas, evaporation, condensation, precipitation, anemometer, barometer, high pressure, low pressure, humidity, rain gauge, thermometer, temperature, wind vane, weather, climate, clouds, cumulus, nimbus, cirrus, stratus, hail, rain, snow, sleet, dew, fog, meteorologist, front, weather map, weather symbols.**

**EVIDENCE OF LEARNING**

**By the conclusion of this unit, students should be able to demonstrate the following competencies:  
 Culminating Activity: Producing a school wide daily television weather program to be used over closed circuit television by predicting the weather by using weather instruments, and collecting weather data from local sources. (Newspapers, local radio, internet sites, and local television stations.**

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### GRASPS

**Goal:** Students will set up a school weather station using weather instruments from the Science Lab or Media Center and monitor, collect daily data, communicate patterns, and record the findings. The data would be used to report the weather daily during the morning announcements using a weather map. Students will explain symbols on the weather map to the audience as they explain patterns that show various weather conditions.

**Role:** Meteorologists will collect data using the weather station, weather websites, newspapers, and local television weather reports.

**Audience:** Peer students, teachers and office staff.

**Scenario:** Students will become meteorologists and predict and report the weather daily, broadcasting over closed circuit television throughout the school on a daily basis. Reference to the water cycle will be reported and questions will be asked weekly.

**Product:** Daily weather broadcast.

Extension: Encourage groups of students to compare weather data and forecasts to various media sources such as radio, television, newspaper, and internet sources.

### Teacher Resources

[www.conservewatergeorgia.net](http://www.conservewatergeorgia.net)

[www.epa.gov/safewater/kids/flash/flash\\_matching.html](http://www.epa.gov/safewater/kids/flash/flash_matching.html)

[www.publicaffairs.water.ca.gov/education/catalog.cfm](http://www.publicaffairs.water.ca.gov/education/catalog.cfm)

[www.nwwater.com](http://www.nwwater.com)

[www.publicaffairs.water](http://www.publicaffairs.water)

[www.jea.com](http://www.jea.com)

### Suggested Literature

More information and activities about water can be found in the books below.

Common Ground: The Water, Earth, and Air We Share by Molly Bang

The Drop in My Drink by Meredith Hooper and Chris Coady

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A Drop of Water: A Book of Science and Wonder by Walter Wick

The Earth and I by Frank Asch

The Magic School Bus: At the Water Works by Joanna Cole

The Magic School Bus: Wet All Over by Joanna Cole

The Magic School Bus: On the Ocean Floor by Joanna Cole

The Magic School Bus: Takes a Dive by Joanna Cole

I Am Water (Hello Reader! Science Series) by Jean Marzollo

Water by Frank Asch

Water, Science, Water Fun: Great Things to do with H<sub>2</sub>O by Noel Fiarotta and Phyllis Fiarotta

Where Does Water Come From? by C. Vance Cast

Where Do Puddles Go? by Fay Robinson